

論文の英文要旨

**Title : The Acoustic Study on Japanese Geminate Production
within Speech Rates**

Name : Yi Kyong-Suk

Abstract

This dissertation deals with the analysis of Japanese geminate consonants from the perspective of production, and addresses phonetic features of the geminate consonants through the method of phonetic experiments.

Chapter 1 deals with the aim of this research, as well as its background.

Chapter 2 deals with the preceded studies. Their outcomes and issues will be discussed, as well as the aim and the plan of this research.

There is a consensus on the perspective that suggests the duration of consonants as a main cue in distinguishing the geminate consonants. However, there are various points of view regarding specific criteria for deciding the duration of obstruent portions.

Firstly, many of the preceded studies defined geminate consonant as the ratio between duration of double consonant and single consonant. With this definition, it can be said that geminate consonant is always perceived by in comparison with singleton.

Fujisaki & Sugito (1977)'s theory has some questionable aspects. It is unclear whether the perception of geminate consonant is the ratio between geminate duration

and "preceding mora", or the ratio between the duration of the obstruent portions and "preceding vowel". There hasn't been enough consideration regarding this matter.

Secondly, even though the speech rate has great influence on the duration, research into the relationship between the geminate consonant and the speech rate is seldom done.

Thus this experiment examined the theory of Fujisaki & Sugito (1977), which is considered to be the aptest for explaining the process of perceiving geminate consonant, as well as many other theories concerning the geminate consonant.

In this experiment, speech rate was considered as a continuum (something that changes continuously) and along with broadening the range of speech rate from fast to slow, geminate consonant was analyzed in terms of its production. At the same time, Fujisaki & Sugito (1977)'s theory, which is considered to be the most convincing theory, was examined with test words of CVCV type.

In the experiment, 5 subjects were instructed to utter 12 test words of geminate consonant and singleton, which differs in the manner and the place of articulation, by three different speeds of Fast, Normal, and Slow.

The result of the experiment is as followed.

1) Validity of regarding VOT as a part of vowel

Beckman (1982) pointed out the necessity of clarifying whether VOT is being put in consonant or vowel, when conducting a research involving geminate consonant. Even in the preceded studies (Beckman 1984 ; Sato 1988) which presumed VOT as a part of either consonant or vowel have not made clear why or how it needs to be considered as such.

However, it has been realized through the experiment that VOT needs to be considered as vowel and this was found through the rates of C/V1 and C/M1.

When VOT is considered as vowel rather than consonant, the dispersion of data of each singleton and geminate consonant is smaller. Also, in regarding the pattern of dispersion of singleton and geminate consonant, the polarization is much clearer when VOT is considered as vowel rather than consonant.

2) Geminate consonant is determined by C/M1 ratio, not C/V1 ratio

Fujisaki & Sugito (1977) stated the perception of geminate consonant is determined by relative ratio between geminate duration and preceding vowel (preceding mora).

However, even though it is possible to take the statement as both preceding vowel and preceding mora, Fujisaki & Sugito (1977) contended that the perception of geminate consonant is determined by the relative ratio with preceding vowel. Therefore, this experiment examined whether it is the relative ratio with preceding vowel or preceding mora through experiment on geminate consonant production.

To begin with, it was discovered, from the scattergram which indicated the relation of C/V1 and C/M1 with word duration (= speech rate), that the ratio of C/V1 and C/M1 changes with speech rate, and the ratios of C/V1 and C/M1 increase as speech rate decreases.

However, the distribution rates of C/V1 and C/M1 in singleton and geminate consonant are much more clearly polarized when compared to C/M1, rather than to C/V1. In other words, geminate consonant production takes the length of preceding mora as a criterion and adjusts geminate duration so it can stay above a certain ratio.

3) A cue for distinguishing in accordance with following vowel

When the production experiment was conducted by considering speech rate as a continuum, also with introducing three different categories of speeds such as Fast, Normal, and Slow, it was observed that there exist proximity, in the category of Fast speed, between the C/M1 ratios of both geminate consonant and singleton. This, the proximity of borderline of singleton and geminate consonant in terms of production, is something that hasn't been pointed out in preceded studies up until now. Also, in such cases, C/M1 ratio of geminate consonant is as low as the singleton's ratio. So why it sounds like geminate consonant even though C/M1 ratio is not sufficient to be qualified to be one? It is considerable that there exists another cue to take into account when dealing with the matter of perceiving geminate consonant.

It is my understanding that there hasn't been any report whatsoever, regarding following vowel in geminate consonant production, and it has been considered that following vowel has no influence on perception of geminate consonant. (Hirato & Watanabe, 1987)

Also, if C/V2 ratio and C/M1 ratio are taken as criteria, overlap of distribution vanishes, in spite of overlap in C/M1 ratios of test words.

Therefore, the geminate consonant production can be considered to adjust the length of geminate duration to rise above a certain ratio by taking the length of preceding mora as a criterion, and at the same time, it is considerable that C/V2 ratio distinguishes singleton and geminate consonant by maintaining a certain ratio.

4) Relation between cue for phoneme discrimination and variation of speech rate

Until now, many researches that dealt with geminate consonant production obtained their results only with normal speech rate. Researches that dealt with continuously

varying speech rates are close to none. For that reason, how the cue (for distinguishing singleton and geminate consonant) works in regard to the change of speech rate has not been clarified.

In continuous change of speech rate, C/M1 ratio of geminate consonant increases as the speech rate decreases, and the range of ratio change is large. But in contrast, it has been found that the range of ratio change in singleton's C/M1 ratio is strictly limited. In other words, as the speech rate decreases, distinction between geminate consonant and singleton becomes clearer, and it is the singleton, rather than the geminate consonant, which is sensitively restricted by C/M1 ratio.